

part of Baron Osten Sacken's entomological work consisted in working up the Diptera of North America, in close collaboration with Dr. H. Loew. This work had for its main object the compilation of a catalogue of North American Diptera of which a first edition was published as early as 1858 by the Smithsonian Institution. It was superseded by a far more complete second catalogue published twenty years later. A great deal of further time was taken up with the self-imposed and, at times, somewhat tedious task of editing and translating Loew's monographs, and, in addition, important papers were published on the Tipulidæ, Tabanidæ, Cecidomyidæ, and Cynipidæ. Between 1871 and 1873 some time was spent in Europe, and in 1876 an expedition was made to California the results of which were published under the title "Western Diptera" in the Bulletin of the U.S. Geological and Geographical Survey. Eleven new genera and 137 new species were described.

In 1877 Baron Osten Sacken came to Europe, and took up his abode at Heidelberg. The present writer first met him there in the summer of 1877, and, being greatly interested in entomology as a hobby a close friendship sprang up, which soon became a friendship for life. In the years which followed and which constituted the third period of his entomological career, Baron Osten Sacken published numerous critical papers on Diptera, and increased the number of his published writings from 53 to 179. In 1881 he published "An Essay on Comparative Chætotaxy," in which it was shown for the first time that the arrangement of the bristles on the bodies of Diptera afforded a valuable aid to their classification. In 1892 he published one of his most important papers, on the characteristics of the three divisions of Diptera, *Nemocera vera*, *Nemocera anomala*, and *Eremochæta*, in which two important innovations were introduced, one referring to the preservation of the distinction between the Brachycera and Nemocera, the other to the grouping of the families of Diptera into larger groups, for which he subsequently adopted Comstock's name of "Superfamilies."

The "Bugonia" superstition of the ancients regarding the production of bees from the carcases of dead animals found a ready explanation at Baron Osten Sacken's hands in the close resemblance to a bee of the common drone-fly, *Eristalis tenax*, the larvæ of which live in putrescent matter. In the paper, first published in commemoration of the twenty-fifth anniversary of the Italian Entomological Society in 1893, and afterwards amplified and printed at Heidelberg, Baron Osten Sacken traces in detail the history of the Bugonia in different ages and nations.

His last important task was to publish a "Record of My Life-work in Entomology," which he concluded in 1904, to quote his own words, "at the age of seventy-six, in good health, and with unimpaired eyesight."

Baron Osten Sacken took great delight in everything connected with mathematics, especially historical points, and the present writer has an early recollection of a question he proposed relating to the conchoid of Nicomedes. In his later years he made a collection of photographs of paintings of the great masters, and it gave him pleasure to arrange and classify them with the same systematic attention to minute detail that he had so successfully brought to bear on the classification of the Diptera. In his manner of living he was equally methodical, and this spirit is shown in the publication of his "Record." His interest in the work of others won for him many friends, who will greatly miss him. He has given us an excellent example of what can be done by a man

who cultivates some branch of science for its own sake, and who is not debarred by pressure of professional duties from making the study his life-work. For such workers, biological rather than physical subjects in many cases offer the most promising field.

G. H. BRYAN.

NOTES.

PROF. G. VON NEUMAYER, who celebrates his eightieth birthday to-day, will receive the congratulations of many meteorologists and other scientific workers. Nearly a year ago the first part of a third revised edition of instructions and notes on scientific observations for travellers, edited by him under the title "Anleitung zu wissenschaftlichen Beobachtungen auf Reisen," was published, and the last part appeared very opportunely a few days ago. The work has been brought up to date, and is of such a comprehensive nature that justice cannot be done to it in a hurried notice, but we hope to deal with this important contribution to scientific literature in a future issue.

MR. W. DE FONVIELLE informs us that Mr. W. Wellman and his balloon—the *United States*—have left Paris for Spitsbergen by way of Antwerp, where the balloon was shipped to Tromsø, and from there to Magdalena Bay, lat. 79° 40' N. (Danes Island). The last part of the voyage will be executed on board the *Fritjof*, a steamer put at the disposal of the explorer by the American Government. Mr. Wellman hopes to be in Tromsø before June 25, and at Danes Island on July 1. There he will find everything ready for the inflation of his large balloon, measuring 6300 cubic metres, and having a gross lifting power of 7000 kilograms. The necessary preparation will be made by Major Hearsey, of the U.S. Weather Bureau, who left Paris a month ago in order to erect at Danes Island a shelter where the balloon may be housed during the preliminary experiments, which are expected to occupy the whole of July. It is only in August that the departure for the Pole is to take place, if the experiments have proved satisfactory and have been concluded. Mr. Wellman is travelling with Mr. Collardeau, a French chemist, and Mr. Hervieux, a French aéronaut, who is to be the pilot of the polar balloon. In addition to Mr. Wellman, the balloon will have on board Major Hearsey, Mr. Hervieux, and two Norwegian sailors who assisted him in his two previous explorations. A wireless telegraphy system will be established between the two stations of Tromsø and Danes Island. A meteorological station will also be established at the same places, supplied with a captive balloon for obtaining records of the temperature, humidity, direction and force of the wind in the free atmosphere. So for the first time since telegraphy (wire) was utilised in meteorology, American and European meteorologists will have at their disposal observations of the weather in the neighbourhood of the North Pole as well as from tropical stations.

THE second of the two annual conversazioni of the Royal Society was held as we went to press last night.

MR. W. R. COOPER has accepted the position of editor of the *Electrician* in succession to Mr. F. C. Raphael, who will retire on June 30.

IT is stated by the *British Medical Journal* that the institute for the experimental investigation of cancer at Heidelberg is now complete. Prof. Czerny is the director; Dr. von Dungern has been appointed head of the scientific department, and Dr. von Wasielewski head of the department of parasitological research.

We learn from *Science* that Mr. George Eastman, of Rochester, N.Y., has subscribed 200*l.* annually for the next three years to enable the continuance of research work in photography at the Yerkes Observatory of the University of Chicago. The investigations will be carried on by Mr. R. James Wallace, photophysicist at the observatory.

THE death is announced, in his eightieth year, of M. Edouard Piette, the distinguished archæologist. M. Piette was well known for his discoveries of prehistoric remains, among which may be mentioned those in the caverns of Mas d'Azil (Ariège) and of Brassempouy (Landes). Before his death M. Piette presented his invaluable collections to the Museum of Saint-Germain-en-Laye.

H.M. THE QUEEN has extended her patronage to the "Country in Town" Exhibition which will be opened by H.R.H. Princess Christian in the Whitechapel Art Gallery on July 5. The exhibition will be open until July 19, and as admission will be free, contributions are invited towards the necessary expenses. All communications should be made to the honorary secretary, Mr. Wilfred Mark Webb, at Toynbee Hall, Whitechapel, E.

THE *Times* correspondent reports that Dr. Calmette and M. Guérin, of the Pasteur Institute, Lille, have communicated to the Paris Academy of Sciences the results of experiments on protective inoculation against tuberculosis. Having found that dead tubercle bacilli are carried from the digestive tract to distant parts of the body, they made experiments in order to ascertain the immunising effect of dead tubercle bacilli administered in this manner. Young animals, heifers and kids were given by the mouth two doses, with a forty-five days' interval between, of 5 and 25 centigrams of dead tubercle bacilli (or even living bacilli of feeble virulence). A subsequent lethal dose of virulent tubercle bacilli proved innocuous to the animals treated in this way, showing that the dead bacilli had produced an immunity against the living virulent bacilli. Dr. Calmette and M. Guérin conclude that young cattle can be vaccinated by intestinal absorption of bacilli modified by heat, and that this method of vaccination is entirely without danger.

THE council of the Society of Arts has awarded the society's silver medal to the following readers of papers during the session just completed:—Mr. W. F. Mitchell, The commerce and industries of Japan; Dr. William Arthur Aikin, Aspects of voice development; Mr. Leon Gaster, Progress in electric lighting; Mr. Walter Garstang, The fisheries of the North Sea; Captain G. S. C. Swinton, London traffic; Mr. Bernard B. Redwood, Motor boats; Mr. J. B. Millett, Submarine signalling; Prof. Thomas Oliver, Bridge building by means of caissons; Mr. Clayton Beadle, Watermarking; Sir James A. Bourdillon, K.C.S.I., The partition of Bengal; Dr. George A. Grierson, The languages of India; Colonel Sir Arthur Henry McMahon, K.C.I.E., Seistan; the Hon. Rodolphe Lemieux, K.C., French Canada; the Hon. J. G. Jenkins, Social conditions in Australia; Mr. Louis N. Parker, Historical pageants; Mr. H. Yates Thompson, Illuminated manuscripts; and Mr. Harry Powell, Cut glass.

THE death of Herr Eduard von Hartmann is announced from Berlin. Born in 1842, he was intended for a military career, but retired from service in 1865 owing to a malady of the knee which made him a cripple for life. He received the degree of Doctor of Philosophy from Rostock University in 1867, and two years later published "The

Philosophy of the Unconscious," the work on which his reputation chiefly rests. A very voluminous writer—his works contain upwards of 12,000 pages—he published, among other writings, "Phenomenology of Ethical Consciousness" in 1879, "The Religious Consciousness of Mankind in the Stages of its Development" in 1881, and "The Religion of the Spirit" in 1882. About three or four years ago there appeared "Die Weltanschauung der modernen Physik," one of the most important of his later works. His system was an amalgamation of Schopenhauer's doctrine of will with the metaphysic of Hegel, and the "Unconscious" which formed his first principle was but another name of the absolute of the German metaphysicians. "According to von Hartmann," writes one authority, "the Unconscious is the absolute principle active in all things, the force which is operative in the inorganic, organic and mental alike, yet not revealed in consciousness. It is the unity of unconscious presentation and will, of the logical (idea) and the alogical (will). The Unconscious exists independently of space, time and individual existence, timeless before the being of the world. For us it is unconscious, in itself it is super-conscious." The Schopenhauerian side of von Hartmann appealed to the prevailing pessimism of the time, but he himself was no pessimist; full of vigorous ethical feeling, and a strong opponent of the prophets of the *Weltschmerz*, he contributed not a little to the discussion of political and social subjects.

THE Society of German Engineers, which with its 20,000 members is now the largest technical society in the world, celebrated on June 11–14 the completion of the fiftieth year of its existence. The opening ceremony was held in the Reichstag building in Berlin, under the presidency of Dr. A. Slaby. Congratulatory addresses were delivered by the Prussian Home Secretary, the Prussian Minister of Education, the Oberbürgermeister of Berlin, and the rector of the Berlin Technical School, as well as by numerous representatives of kindred societies in Germany and other countries, Mr. Bennett Brough (Iron and Steel Institute) speaking for the British societies and Prof. K. E. Hilgard (American Society of Civil Engineers) for the American. The proceedings terminated with a lecture by Dr. W. von Oechelhaeuser on technical work past and present, in which he compared the engineering works of the ancients with those of modern times, and endeavoured to forecast what the future of engineering would be. On June 12 a lecture was given by Dr. A. Riedler, on the development and present importance of the steam turbine; and on June 13 papers were read by Prof. Muthmann, on methods of dealing with atmospheric nitrogen; and by Dr. Hoffmann, on the utilisation of power in mines and metallurgical works. Throughout the week an elaborate programme of visits, excursions, and social functions was arranged for the 1231 members and 464 ladies who took part in the meeting. The German Emperor honoured the society by accepting the Grashof gold medal, and by conferring decorations on the president and other prominent members. An interesting history of the society is given in *Engineering* of June 8. The growth of the society has certainly been remarkable. It was founded in 1856 at Alexisbad, in the Hartz, by twenty-three young engineers. Friedrich Euler was elected the first president, and Franz Grashof the first secretary and editor, the work of the society being carried on in the secretary's private study. The society now has a stately house of its own and a staff of forty-seven officials. Its weekly journal last year cost 26,162*l.* for publishing and 6425*l.* for postage.

THE fourth part of vol. xxvi. of Notes from the Leyden Museum is devoted to invertebrates, more especially crustaceans and insects, Dr. van der Weele contributing three papers on Neuroptera, Mr. C. Ritzema one on a new Sumatran beetle, while Dr. de Man discusses and figures certain crustaceans of the genus *Palæmon*.

HUNTED for four months in the year over a great part of England, and almost everywhere shot and trapped on every possible occasion, the otter, observes Mr. J. C. Tregarthen in a delightful article in the June number of the *Monthly Review*, yet manages to survive in the British Isles in a manner and in numbers which are truly surprising. The fox, were he not rigorously protected, would disappear from the greater part of England in a very few years, and yet the otter, without the aid of any protection and despite unremitting persecution, continues to flourish in our midst, and this, too, in face of the fact that the female breeds only once a year, and then gives birth to but three or four cubs. The fact that he is here to-day and gone to-morrow—maybe a score of miles away—is, in the author's opinion, the reason of the otter's success in life. It will be news to many of our readers that there are no less than twenty packs of otter-hounds in England and Wales; and now that most of the "methods of barbarism" have been abolished, the author enters a vigorous protest against the attempts of "grandmotherly legislation" to abolish an ancient and exciting sport.

EXTRACTS from two letters written by Mr. T. R. Bell in 1903 and 1904 from India concerning certain butterflies in that country form the most generally interesting portion of the contents of the June number of the *Entomologist's Monthly Magazine*. Special stress is laid by the writer on dimorphism in these insects due to the time of year at which they were developed, the dry-season imagos, owing to what may be described as practical starvation, differing in many cases very markedly from the well-fed wet-season forms. On such differences several nominal species have been founded. Very noteworthy is the fact that in species of the same genus the differences between the dry and the wet forms frequently take quite different lines. "Ocellation" on the under-side of the wings appears, however, to be a distinct character of the wet forms. In breeding certain butterflies, such as some of the "blues," at Kanara it was noticed that males and females came out in equal numbers, whereas in a state of nature the latter are scarcely ever seen, or if observed are found in thick underwood, while the males bask in the open sunshine.

THE *Museums Journal* for May contains the report on the discussion following the papers on the relation of provincial museums to national institutions read at the Museums Association Conference at Worcester last year. The points for discussion ranged themselves under two main headings:—(1) that museums should be taken over by Government, and "run" practically without local assistance; and (2) that all important specimens should go to a national collection. The first proposition met with a direct traverse in one of the papers read, the author of which urged that museums get on much better in proportion as they are independent of Government aid. As regards the second point, which, in the case of zoological museums, related mainly to type-specimens, the question was raised as to the proper places of deposition for such specimens. Should, for example, Indian types go to Calcutta and American to New York, or, on the other hand, should types described in England be placed in the

British Museum and those named in America be transferred to New York or Chicago, and so on? Incidentally, it was mentioned that if a national collection received such a valuable augmentation it ought to do something in return, and it was accordingly suggested that the British Museum should start a zoological loan collection. No definite motion was agreed to on any one of these points.

A NEW salamander from North Carolina, remarkable for its brick-red legs, which contrast with the leaden hue of the body, is described in No. 1457 of the Proceedings of the U.S. National Museum by Dr. Stejneger under the name of *Plethodon shermani*. New crickets and leaf-winged grasshoppers, or "katydids," from Costa Rica form the subject of No. 1459 of the same serial, the author being Mr. J. A. G. Rehn. A species of *Mimetica* has the

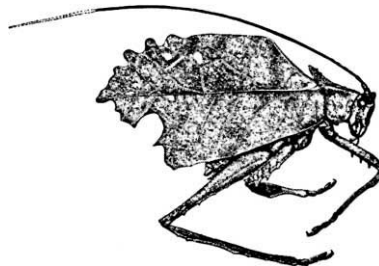


FIG. 1.—*Mimetica crenulata*, lateral view of type.

"tegmina," or front wings, of the usual dried-leaf type, and of a form which defies description, although well shown in the accompanying illustration. In part 1458 of the same serial Mr. C. D. Walcott resumes his account of the Cambrian faunas of China, basing his observations on new material. It is anticipated that a fully illustrated report on the subject will be published before the close of the present year.

THE June number of the *Popular Science Monthly* contains several articles of great interest to biologists and geologists. Dr. D. S. Jordan has some suggestive observations on variation in animals and plants. He points out, for instance, that in many cases adaptive characters are older than non-adaptive, as exemplified by the fact that flying-fish flew before the differentiation of the existing genera. Mutation—or saltation, as he prefers to call it—is regarded as only an extreme development of individual fluctuation, the author adding that "while saltation remains as one of the probable sources of specific difference, its actual relation to the process of species-forming in nature remains to be proved." Prof. Carl Eigenmann's article on the fresh-water fishes of South and Central ("Middle") America is worthy of the best attention of all interested in zoological distribution. The leading features brought to notice are:—(1) the variety of the fish-life in tropical South America; (2) the paucity of family-types contributing to this variety; (3) the poverty of the Central American fish-fauna and its essential South American character, except for (4) the isolation of the fauna of the Mexican plateau; (5) the poverty of the Pacific slope fish-fauna and its essentially Atlantic type; (6) the "marine" character of the fishes of Lake Titicaca; (7) the poverty of the Patagonian fauna and its essential distinctness from that of Brazil; and (8) the similarity between the fish-fauna of tropical America and that of tropical Africa. As regards the latter point, the author observes that "a land-connection, whether a land-bridge, intermediate continent, or land-wave, between the two continents is imperative. This land-connection must have existed before the origin of existing genera and before many of the existing families."

As a result of visiting several of the more important herbaria in Europe to study the genus *Eupatorium* and several allied genera, Mr. B. L. Robinson has published some notes on the Eupatorieæ in the Proceedings of the American Academy of Arts and Sciences, vol. xlii., No. 1. In addition to the diagnoses of new species of *Eupatorium* and other genera, the pamphlet contains revisions of the genera *Piqueria* and *Ophryosporus*, also a discussion of the genus *Helogyne*.

A SUGAR experiment station was instituted in Jamaica in April, 1904, under the direction of Mr. H. H. Cousins, for investigating problems in connection with the sugar and rum industries. The report for 1905 indicates what is being done in the matter of cultivation experiments to test different manures and varieties and to select new seedling canes. The advantage to be gained by taking new varieties into cultivation is well shown by the results obtained on the Albion Estate, where the Mt. Blanc variety generally grown produces less than any other variety tested, and furnishes less than half the saccharose yield per acre of the seedling B 379.

AN inquiry into the manufacture of Jamaica rums, by Mr. C. Allan, occurring in the above report, deals with fermentation changes, more especially those that give the quality to flavoured rums. It appears that the flavour is due mainly to the large amount and nature of the ethers formed. Premising that the characteristics of Jamaica rum are derived from saccharine liquors rich in albuminous matter fermented by yeasts and bacteria, in the case of the high-flavoured rums bacterial action is greatly increased and special bacteria are developed, producing acids that in combination with alcohol form aromatic ethers. It is suggested that higher alcohols, furfural, and aldehydes may help to give body to the spirit.

In a paper read before the National Academy of Sciences, U.S.A., on April 17, the distinguished seismologist Major C. E. Dutton discusses the possible relationship between volcanic action and radio-activity. The theory brought forward is that, in limited tracts at depths of less than four miles, rocks are melted by heat due to radio-activity. As the melting proceeds, the water contained in the rocks becomes explosive and an eruption follows. When all the lava is exhausted the reservoir is closed. In due course more heat is generated, rocks are again melted, and a second eruption takes place. This explains, not only the repetitive character of eruptions, but the comparatively shallow depth at which they originate. The horizon of molten rock, if it is dependent on secular cooling of the world, would be at a depth of 30 miles or 40 miles, while if it is due to radio-activity it may possibly be found at a depth of three or four miles.

AN interesting supplement on modern air compressors, covering twenty pages with seventy-three illustrations, is published with the *Engineer* of June 15. It gives an excellent review of the great strides made during the last fifteen years in the use of compressed air. The development of the use of compressed air as a means for transmitting power appears the more remarkable when it is remembered that during the same period the use of electricity for that purpose has grown enormously.

THE Engineering Standards Committee has made arrangements with a firm at Bilston to manufacture commercial sets of standard pipe-flange templates in large quantities. The templates are made, with extreme

accuracy, of thin steel plate painted over with aluminium paint, a small piece being cut out at the extremity of each centre line so as to enable the fitter to see that the centre line of the template coincides with the centre line of his flange. The existence of these templates should enable full advantage to be taken of the standardisation that the committee has sought to effect.

In a note to the *Rendiconti della R. Accademia dei Lincei* (dated April 22 last) Dr. F. Eredia gives the monthly and yearly rainfall values obtained at the Collegio Romano for eighty-one years, 1825-1905. Observations were begun there in 1788, but their continuity and uniformity were not quite satisfactory prior to 1825. The annual mean for this long period is 31.8 inches. The wettest months are October to December; the maximum fall in any month was 14.7 inches, in November, 1878.

THE weather report issued by the Meteorological Office for the week ending Saturday, June 16, shows that the weather for the period was fine and dry generally. The sky was cloudy in the eastern and southern counties of England, and some rain fell in all districts. Thunderstorms occurred in various parts of England on June 12 and 16. Temperature was generally low for the time of year, and in the east of England the mean was 4° below the average. At Dumfries, in the west of Scotland, the thermometer rose to 83°, and in the east of Scotland and in the north-east of England it exceeded 80°. In the north of Scotland the range of temperature for the week amounted to 49°. The winds were mostly from between north and north-east.

AN illustrated price-list of echelon diffraction gratings, just issued by Messrs. Adam Hilger, 75a Camden Road, N.W., will be found to be of interest by all practical spectroscopists. The gratings contain from ten to forty plates, the corresponding prices, including suitable mounts, ranging from 13*l.* to 120*l.* The heights of the plates vary from 32 mm. to 40 mm., but can be made higher than this if desired. The standard width of each step is 1 mm., and the thickness of each plate about 10 mm., but this latter dimension may be increased, with a corresponding increase in price, if so desired. The list also contains illustrated descriptions of the more generally used arrangements of the echelon apparatus and of the auxiliary spectroscopes and various accessories employed. Messrs. Hilger make a speciality of the constant deviation spectroscope most usefully employed with echelon gratings, and have just made an important alteration in the adaptation of the telescope and collimator which will greatly increase their rigidity, though the price remains the same.

THE results of a study of the infra-red region of the spectrum, made by M. Milan Stefanik at the Meudon Observatory, appear in the *Comptes rendus* for April 30. While working with the solar eclipse expedition in Spain, M. Stefanik found that, by placing a dark red screen before the slit of his spectroscope, he was able to see to a considerable distance into the infra-red. This led him to continue a research on this matter on his return to Meudon, where he employed a spectroscope having two prisms, containing benzine and carbon bisulphide respectively, and used as the light source an image of the sun projected on to the slit by a lens, after reflection from a silvered plane surface. Screens of various coloured alcoholic solutions were employed, and the best results were obtained when the screen absorbed all the luminous radiations of the spectrum, allowing only the extreme red

and infra-red to pass. M. Stefanik has arrived at the conclusion that if only a limited region of the spectrum be allowed to enter the spectroscope this region is seen much better than if the total light were employed, for, despite the large absorption by the numerous pieces of glass included in his apparatus, he was able to observe and to map easily the spectrum down to $1\ \mu$. The group Z was always easily visible, also X, and the lines π , ζ , σ , and τ more rarely. It appears from the variations in the intensities of the lines that some of them are of telluric origin. According to the *Annuaire* of the Bureau des Longitudes the infra-red is visible to $0.705\ \mu$, but by the employment of the screens M. Stefanik has extended the limit to at least $0.900\ \mu$.

THE Oxford University Junior Scientific Club is to be congratulated on the May number of its Transactions. Prof. H. A. Miers gives an interesting account of his recent investigations, in collaboration with Miss Isaacs, of spontaneous crystallisation and the nature of supersaturated solutions, while a paper by Mr. M. H. Godby, on the place of natural science in education, is full of good things, and deserves notice of a larger public.

In a note in the *Physikalische Zeitschrift* (No. 8, p. 257) Drs. Stefan Meyer and Egon von Schweidler point out that Madame Curie, in a criticism of their work, referred to in *NATURE* (vol. lxxiii., p. 549), misinterpreted the tenor of their original communication in assuming that they considered polonium to consist of a mixture of radium D, radium E, and radium F. The conclusion they actually formed (Proceedings of the Vienna Academy of Sciences, February 1) was in reality the same as that arrived at by Madame Curie, namely, that polonium is identical with radium F. In another paper (Vienna Academy of Sciences, *Anzeiger*, No. 12) Drs. Meyer and von Schweidler confirm, however, the view that radio-lead is a mixture of radium D, radium E, and radium F, and describe the separation of these substances by electrolysis. Several determinations of the constant of decay of radium E were made as a means of characterising this substance, and the nature of a new radio-active product from actinium is discussed.

THE transformation of oxygen into ozone at high temperatures is the subject of a paper by Messrs. Franz Fischer and Fritz Braehmer in the *Physikalische Zeitschrift* (No. 9). It is shown that when a platinum wire or a Nernst filament is rendered incandescent whilst surrounded by liquid oxygen, or when an arc lamp or hydrogen flame is played upon liquid oxygen, ozone is formed. When the action is prolonged the amount of ozone formed increases; in one experiment 1 per cent. by weight of the oxygen used underwent condensation. Experiments are adduced to prove that the formation of ozone in these cases is solely a thermal phenomenon, and is not to be referred to an ozonising ultra-violet radiation. When any of the methods of heating described are adopted in ordinary air, nitric oxide appears to be the sole product; in such a case the ozone is not cooled and removed from the sphere of action sufficiently quickly to prevent its decomposition. It is well known that when a hydrogen flame burning in oxygen is played upon water or ice hydrogen peroxide is formed in minute quantity; it is interesting to note that when hydrogen is burnt in liquid oxygen no hydrogen peroxide can be detected. In the former case water is oxidised to hydrogen peroxide, in the latter molecular oxygen is converted into ozone.

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OUR ASTRONOMICAL COLUMN.

DISCUSSION OF FACULÆ OBSERVATIONS.—An interesting discussion of the observations of faculæ, in which Prof. Mascari compares the frequency and intensity of these phenomena with the solar activity as indicated by sun-spots and the variation of the total luminous radiation from the solar disc, appears in No. 5, vol. xxxv., of the *Memorie della Società degli Spettroscopisti Italiani*.

Since 1894 the groups of faculæ on the solar disc have been observed, and their number and intensity recorded, on every day that the atmospheric conditions were favourable. The intensities were classified in five groups, viz. brightest (V.V.), bright (V.), ordinary, weak (d.), and weakest (d.d.).

Analysing the results thus obtained, Prof. Mascari finds that the third class (and possibly the second and third classes) decreased in frequency from that year of sun-spot maximum until 1901, sun-spot minimum, and then increased regularly up to the 1905 maximum. The (d.) and (d.d.) classes varied in the inverse sense.

Assigning numerical values to these classes, from 5 for the (V.V.) to 1 for the (d.d.), and taking the grouped mean for each year as the relative annual brightness of the faculæ, Prof. Mascari finds that this mean brightness also varies with the sun-spot activity, being 2.83 in 1894, 1.88 in 1901, and 2.97 in 1905. Combining, as a product, the mean frequency of the faculæ for each year with their relative mean brightness a similar result is obtained, the respective values being 29.80 in 1894, 4.62 in 1901, and 19.63 in 1905.

These results, combined with those obtained by himself in 1901 and Tacchini in 1878 showing that the chromospheric phenomena were less bright at sun-spot minima than at maxima, led Prof. Mascari to the conclusion that the luminous radiation of the sun is greater at the spot maxima than it is at the epochs of minima.

NEW METHOD FOR THE DISCOVERY OF ASTEROIDS.—In No. 4, vol. xxiii., of the *Astrophysical Journal*, Mr. J. H. Metcalf, of Taunton (Mass.), describes a method which he has employed successfully in the photographic discovery of asteroids.

This method is really an adaptation of that employed in the photography of comets, where the observer, instead of following the guiding star in the usual way, regularly moves the photographic plate during the exposure so that it follows the object which he hopes to photograph, and thus obtains a well-defined single image of that particular object, whilst the surrounding stars are represented on the plate by trails.

By moving his plate in a direction parallel to the ecliptic at a rate previously computed for an ideal asteroid, Mr. Metcalf has obtained some excellent, well-defined circular images of several known faint asteroids, and has also discovered some new ones. For example, one of the reproductions which accompany his paper shows a pair of images of an asteroid of the thirteenth magnitude which he discovered on March 22.

RADIAL VELOCITY OF α DRACONIS.—A brief note by Herr H. Ludendorff, published in No. 4088 of the *Astronomische Nachrichten*, confirms the variability of the radial velocity of α Draconis announced by the Lick observers. According to the latter, the radial velocity on June 16, 1902, was 0 km., and on May 4, 1903, and June 19, 1904, it was -42 km.; values of -43 km. and -40 km. were also obtained.

On two plates secured with the Potsdam spectrograph (iv.) on May 23 and 24, 1903, the displacement of the lines λ 4481 and H γ gave the radial velocity of this star as -17 km. and -14 km. respectively.

USEFUL TABLES AND FORMULÆ FOR ASTRONOMICAL COMPUTATIONS.—No. 15 of the Publications of the Groningen Astronomical Laboratory contains a number of tables for photographic parallax-observations, prepared by Dr. W. de Sitter. Each table gives the parallax factors, for each hour of R.A., for every 10° of latitude, and also shows the limiting dates between which a star of the stated R.A. may be observed photographically.

No. 16 of the same publications is given in the same volume, and contains a number of trigonometrical formulæ